

# Evidence of Performance

Sealing tape according to DIN 18542  
Exposure Category 1 (BG 1)

Test Report 105 41246/2 R1 e U



Client **Schul International CO., LLC**  
One Industrial Park Drive

03076 NH Pelham  
United States

Product **Impregnated sealing tape made of cellular plastics,  
self-adhesive on one side**

Designation **Willseal**

Dimensions  
( $t_F$  /  $b_{max}$ ) **8 to 50 / 2 to 42**

Material **Flexible polyurethane foam**

Impregnation **Acrylate-based**

Special features **-/-**

## Basis

DIN 18542 : 2009-07  
Sealing of outside wall joints  
with impregnated sealing tapes  
made of cellular plastics, im-  
pregnated sealing tapes - Re-  
quirements and testing  
Test Report 105 33676/2 R1 e  
dated 31 August 2009

## Representation



## Instructions for use

The present test report serves  
to demonstrate the above char-  
acteristics according to  
DIN 18542 : 2009-07.

## Validity

The data and results given re-  
late solely to the tested and de-  
scribed specimen.

The present test does not allow  
any statement to be made on  
further characteristics of the  
present sealing tape regarding  
performance and quality.

## Notes on publication

The ift Guidance Sheet "Condi-  
tions and Guidance for the Use  
of ift Test Documents" applies.

The cover sheet can be used  
as an abstract.

## Contents

The report contains 9 pages  
and 1 annex.

- 1 Object
- 2 Procedure
- 3 Detailed results
- 4 Evaluation  
Annex 1 (2 pages)

Test as per DIN18542 Clause	Requirements according to DIN 18542 for exposure category BG1	Results of test
7	Transferability on the delivery program	Passed
8.2	Air permeability $a < 1.0 \text{ m}^3/[\text{h m (daPa)}^{2/3}]$	Passed
8.3	Watertightness of joints at $\Delta p \geq 600 \text{ Pa}$	Passed
8.4	Watertightness of joint intersections at $\Delta p \geq 600 \text{ Pa}$	Passed
8.5	Thermal shock resistance from $(-30 \text{ to } +90)^\circ\text{C}$ *)	Passed
8.6	Light resistance and resistance to moisture penetration	Passed
8.7	Compatibility with adjoining building materials at up to $+80^\circ\text{C}$	Passed
8.9	water vapour permeability $s_d \leq 0.5 \text{ m}$	Passed
8.10	Reaction to fire, building materials class B1	Passed

\*) Deviation from the standard with extended temperature range

Designation as per DIN 18542

Sealing tape DIN 18542 – BG 1

ift Rosenheim  
31 August 2009

  
Karin Lieb, Dipl.-Ing. (FH)  
Head of Testing Department

ift Centre Glass, Building Materials & Building Physics

  
Wolfgang Jehl, Dipl.-Ing. (FH)  
Test engineer  
ift Centre Windows & Facades



ift Rosenheim GmbH  
Geschäftsführer:  
Dipl.-Ing. (FH) Ulrich Sieberath  
Dr. Jochen Peichl

Theodor-Gietl-Str. 7 - 9  
D-83026 Rosenheim  
Tel.: +49 (0)8031/261-0  
Fax: +49 (0)8031/261-290  
www.ift-rosenheim.de

Sitz: 83026 Rosenheim  
AG Traunstein, HRB 14763  
Sparkasse Rosenheim  
Kto. 3822  
BLZ 711 500 00

Notified Body Nr.: 0757  
Anerkannte PUZ-Stelle: BAY 18  
 DAP-PL-0808 99  
DAP-ZE-2288 00  
TGA-ZM-16-93-00  
TGA-ZM-16-93-60

## 1 Object

### 1.1 Description of test specimen

Product	Impregnated sealing tape made of cellular plastics
Manufacturer	original client
Product designation	Willseal
Material / Base	Flexible polyurethane foam
Density	(100 ± 15) kg/m <sup>3</sup> for $b_{\max} \leq 15$ mm (130 ± 15) kg/m <sup>3</sup> for $b_{\max} > 15$ mm
Impregnation	Acrylate-based
Adhesive layer	One-sided self-adhesive
Type of adhesive	Acrylate-based
Tested dimensions *)	20 / 9 – 20 (nominal joint width 12 mm)
( $t_F$ / $b_{\min}$ - $b_{\max}$ ) [mm]	25 / 9 – 20 (nominal joint width 12 mm) 8 / 1 – 2 12 / 2 – 6 15 / 6 – 15 20 / 11 – 25 30 / 24 - 42

The description is based on inspection of the test specimen at **ift** Rosenheim or at the original client. Item designations/numbers as well as material specifications were given by the original client (Additional data provided by the client are marked with \*).

## 2 Procedure

### 2.1 Sampling

The test specimens were selected by the original client.

Samples delivered:

Type	partly in rolls, partly pre-mounted in test devices
Delivered on	deposited at <b>ift</b>
Registration No.	deposited at <b>ift</b>

### 2.2 Method

The tests were performed as set out by DIN 18542 for exposure category 1 and are listed in Table 1.

**Table 1** Testing to exposure category BG 1

No.	Characteristics	Testing to DIN 18542, Clause	Basis
1	Coefficient of air infiltration $a < 1.0 \text{ m}^3/(\text{h m})$ at 10 Pa pressure difference Air permeability with $a < 1.0 \text{ m}^3/[\text{h m} (\text{daPa})^{2/3}]$	7 and 8.2	DIN EN 12114 : 2000-04, Thermal performances of buildings - Air permeability of building components and building elements - Laboratory test method E DIN 18542 : 2008-02 *)
2	Watertightness of joints at $\Delta p \geq 600 \text{ Pa}$	7 and 8.3	DIN EN 1027 : 2000-06, Windows and Doors – Watertightness – Test method
3	Watertightness of joint intersections at $\Delta p \geq 600 \text{ Pa}$	8.4	
4	Thermal shock resistance from $-20 \text{ }^\circ\text{C}$ to $+80 \text{ }^\circ\text{C}$	8.5	E DIN 18542 : 2008-02 *)
5	Light resistance and resistance to moisture penetration	8.6	DIN EN ISO 4892-2 : 1999-05, Plastics – Methods of exposure to laboratory light sources, Part 2: Xenon-arc lamps
6	Compatibility with adjoining building materials at up to $+80 \text{ }^\circ\text{C}$	8.7	E DIN 18542 : 2008-02 *); ift-Guideline: Compatibility of glazing gaskets with wood finishes, 1983-08
7	Water vapour diffusion resistance	8.9	DIN EN ISO 12572 : 2001-09, Hygrothermal performance of building materials and products – Determination of water vapour transmissions properties
8	Reaction to fire	8.10	DIN 4102-1 : 1998-05, Fire behaviour of building materials and building components, Part 1: Building materials - concepts – requirements and tests DIN 4102-16 : 1998-05, Fire behaviour of building materials and building components, Part 16: "Brandschacht" tests

\*) Released version to the time of testing. There are no technological modifications to DIN 18542 : 2009-07.

Boundary conditions as specified by the standard requirements

Deviations Any deviations from the test methods or test conditions have been documented for the individual tests.

## 2.3 Test equipment

**Table 2** Test equipment

No.	Testing to DIN 18542, Clause	Test equipment	Device No.
1	8.2	Test rig for windows. The test rig was calibrated by the <b>ift</b> Rosenheim annually	26010
2	8.3		
3	8.4		
4	8.5	Oven Freezer Standard climate Calliper gauge	22159 22824 22040 22884
5	8.6	The test was performed at SKZ – TeConA GmbH. See test report No. 85049/08 dated 24-02-2009.	--
6	8.7	Oven Standard climate	22159 22040
7	8.9	The test was performed at MPA Bau Hannover. See test report No. 053822.1 – Hu dated 25-01-2006.	--
8	8.10	The test was performed at the ift Rosenheim, Brandschutzzentrum Nuremberg. See test report No. 261 37676 dated 23-12-2008.	--

## 2.4 Testing

Date/Period November 2005 to December 2008

Test engineer Wolfgang Jehl, Dipl.-Ing. (FH)

### 3 Detailed results

#### 3.1 Air permeability

The test specimens were manufactured by the original client according to DIN 18542, Clause 8.2 and Fig. 5.

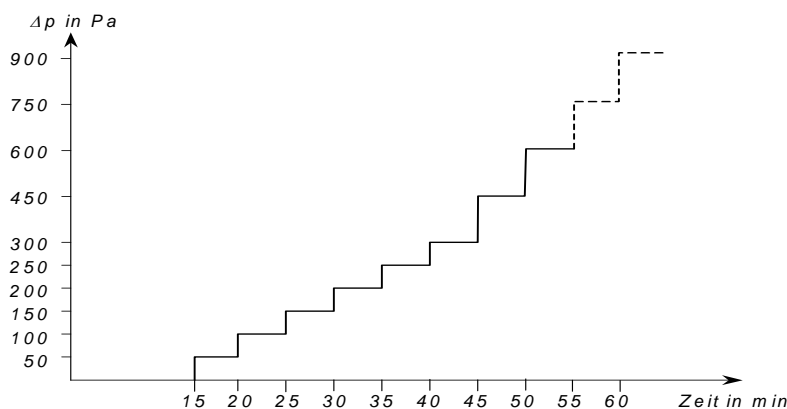
Air permeability of the sealing tape Willseal was tested according to DIN EN 12114 at maximum joint width with pressure ranges of 50/100/150/200/250/300/450/600 Pa as set out by DIN 18542, Annex A. The detailed results are documented in the test record (Annex 1).

The requirements for the coefficient of air infiltration ( $a$ -value) were fulfilled by  $a < 1.0 \text{ m}^3/[\text{h m (daPa)}^n]$ , and those for air permeability were fulfilled by  $a < 1.0 \text{ m}^3/[\text{h m (daPa)}^{2/3}]$  for all tested dimensions of the sealing tape.

#### 3.2 Watertightness of joints

Test specimen as described in Section 3.1.

Watertightness of joints sealed with sealing tape Willseal was tested for a maximum joint width. Testing was performed by application of pressure pulses according to DIN EN 1027 (Fig. 1).



**Fig 1** Representation of the pressure pulses and the chronological sequence

Detailed results are deposited at the original client (Test Report 105 33676/2 R1).

At a pressure differential of  $\Delta p = 600 \text{ Pa}$  no water penetration to the inside was detected. The minimum requirement for watertightness for exposure category BG 1 was fulfilled.

### 3.3 Watertightness of joint intersections

The test specimens were manufactured by the original client according to DIN 18542, Clause 8.4 and Fig. 6.

Watertightness of joint intersections sealed with sealing tape Willseal was tested at a maximum joint width on the intersection variant featuring continuous vertical sealing tape. Testing was performed by application of pressure pulses according to DIN EN 1027 (Fig. 1).

Detailed results are deposited at the original client (Test Report 105 33676/2 R1).

At a test pressure differential of  $\Delta p = 600$  Pa no water penetration to the inside was detected. The minimum requirement for watertightness of joint intersections was fulfilled.

### 3.4 Thermal shock resistance

The test specimens were produced by the original client according to DIN 18542, Clause 8.5 and Fig. 7.

Differing to the standard, the thermal shock resistance was tested at an extended temperature range from -30 °C to +90 °C at a minimum joint width.

Following the test and one day of storage at standard atmosphere neither any discolorations nor any changes were detected on the contact faces. Any migration of impregnation material was not observed. Six hours after opening the test specimen, the average recovery of the tested sealing tape Willseal was above the maximum joint width.

Detailed results are deposited at the original client (Test Report 105 33676/2 R1).

The requirements for the thermal shock resistance were fulfilled.

### 3.5 Light resistance and resistance to moisture penetration

Referring to this test, test report No. 85049/08 dated 24 February 2009 and prepared by SKZ – TeConA GmbH, Würzburg, was submitted.

This test report confirms that the sealing tape Willseal tested at a nominal joint width of 12 mm fulfils the requirements for light resistance and resistance to moisture penetration according to DIN 18542. Six hours after opening the test specimen, the average recovery of the tested sealing tape Willseal was above the maximum joint width.

### **3.6 Compatibility with adjoining building materials**

The test specimens of a nominal joint with of 12 mm were produced by the ift Rosenheim according to DIN 18542, Clause 8.7. Supplementary to the standard requirements, compatibility with acrylic glass made of PMMA, with bright steel, galvanised steel, stainless steel, copper and aluminium was tested.

The detailed results of testing the compatibility of the sealing tape Willseal with adjoining building materials are documented in the test record (Annex 1).

No changes to the contact face nor to the direct edge area of the sealing tape were detected that may have a negative effect on the function. The requirement for compatibility with adjoining building materials was fulfilled.

### **3.7 Water vapour permeability**

The test specimen was produced by the testing body.

Water vapour permeability of the sealing tape Willseal was tested for a joint width of 12 mm according to DIN 18542, Clause 8.9.

Referring to this test, test report No. 053822.1 - Hu dated 25 January 2006 of "Materialprüfanstalt für das Bauwesen, Hannover" was submitted.

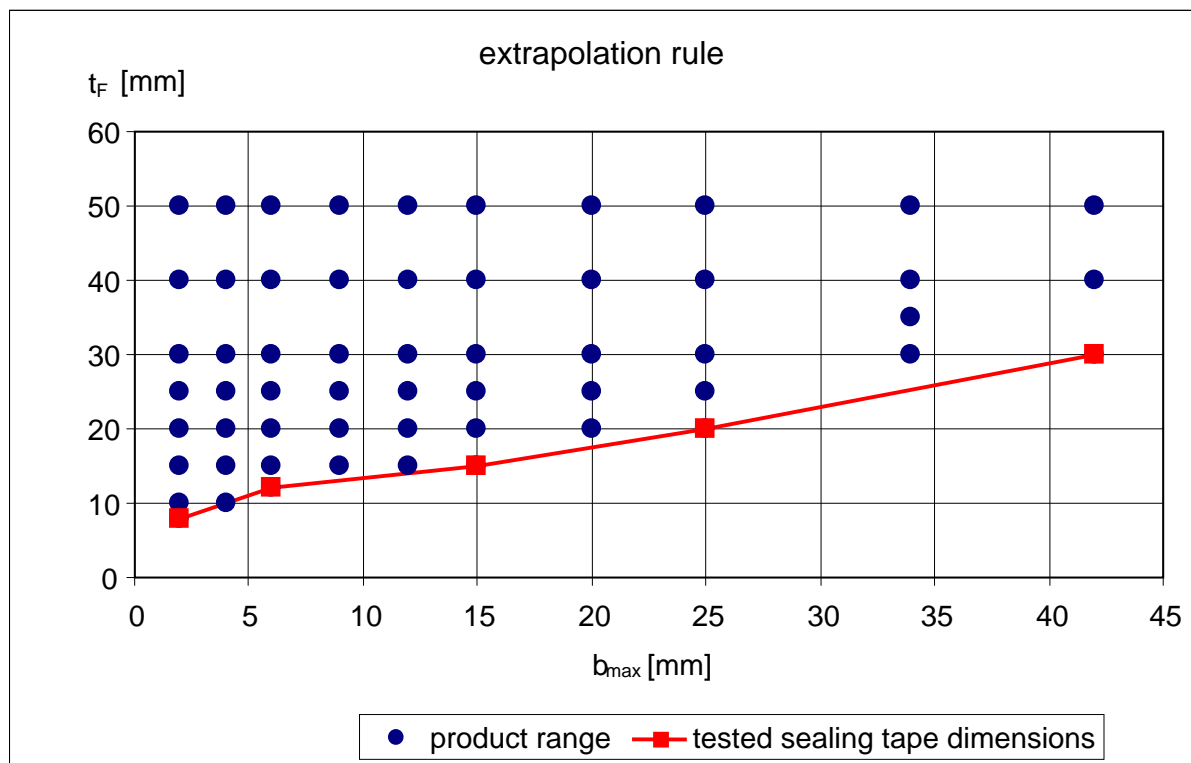
The requirement for water vapour permeability by  $s_d \leq 0,5 \text{ m}$  was fulfilled.

### **3.8 Reaction to fire**

Referring to this test, the national technical certificate 261 37676 dated 23 December 2008 by the ift Rosenheim, Brandschutzzentrum Nuremberg, was presented. According to this certificate, the sealing tape Willseal fulfils the requirements for fire behaviour as set out by DIN 4102-1 for building materials class B1.

### **3.9 Application/extrapolation**

Based on testing selected sealing tape dimensions as per DIN 18542, Clauses 8.2 and 8.3, the results can be applied to the product range specified by the manufacturer for the sealing tape Willseal (Annex 2) for exposure category 1 (BG 1) in conformity with the extrapolation rules set out by DIN 18542, Clause 7. The product range and the tested dimensions of the sealing tape are plotted in Fig. 2.



**Fig. 2** Application of extrapolation rule as per DIN 18542, Clause 7, Fig. 4



## 4 Evaluation

### 4.1 Comparison of requirements and detailed results

Evaluation of the detailed results is listed in Table 3.

**Table 3** Overview of requirements and results related to sealing tape Willseal

Testing to DIN 18542 Clause	Characteristics	Requirements according to DIN 18542 for BG 1	Tested joint cross section $t_F$ / b in mm	Results of test
7 8.2	Air permeability coefficient $a$ at 10 Pa	$a < 1.0 \text{ m}^3 / [\text{h} \cdot \text{m} \cdot (\text{daPa})^n]$	8 / 2 12 / 6 15 / 15 20 / 25 30 / 42	Passed
	Air permeability	$a < 1.0 \text{ m}^3 / [\text{h} \cdot \text{m} \cdot (\text{daPa})^{2/3}]$		
7 8.3	Watertightness of joints at $\Delta p$	$\Delta p \geq 600 \text{ Pa}$		Passed
8.4	Watertightness of joint in- tersections at $\Delta p$	$\Delta p \geq 600 \text{ Pa}$	20 / 20	Passed
8.5	Thermal shock resistance	from (-20 to +80) °C	25 / 9	Passed *)
8.6	Light resistance and resis- tance to moisture penetra- tion	must be guaranteed	30 / 12	Passed
8.7	Compatibility with adjoin- ing building materials	up to +80 °C	20 / 12 25 / 12	Passed
8.9	Water vapour diffusion re- sistance $s_d = (\mu \times t_F)$	$s_d \leq 0.5 \text{ m}$	20 / 12	Passed
8.10	Reaction to fire	B1	50 / 30	Passed

\*) Deviation from the standard with extended temperature range (-30 °C to +90 °C)

### 4.2 Designation

Based on the results the sealing tape Willseal fulfils the requirements of DIN 18542 for the exposure category 1. Therefore it is allowed to be designated as follows

**Sealing tape DIN 18542 – BG 1**

ift Rosenheim  
31 August 2009

The table below shows the product range specified by the original client for sealing tape Willseal (BG 1) and the most unfavourable dimensions selected for the test, according to DIN 18542, Clause 7.

**Table** Product range of Willseal and tested sealing tape dimensions (bold)

Designation	$t_F$ [mm]	$b_{min} - b_{max}$ [mm]	$t_F / b_{max}^*)$ [--]
<b>8/1-2</b>	<b>8</b>	<b>1 - 2</b>	<b>4</b>
10/1-2	10		5
15/1-2	15		7,5
20/1-2	20		10
25/1-2	25		12,5
30/1-2	30		15
40/1-2	40		20
50/1-2	50		25
10/1-4	10	<b>1 - 4</b>	2,5
15/1-4	15		3,75
20/1-4	20		5
25/1-4	25		6,25
30/1-4	30		7,5
40/1-4	40		10
50/1-4	50		12,5
<b>12/2-6</b>	<b>12</b>	<b>2 - 6</b>	<b>2</b>
15/2-6	15		2,5
20/2-6	20		3,33
25/2-6	25		4,17
30/2-6	30		5
40/2-6	40		6,67
50/2-6	50		8,33
15/4-9	15	<b>4 - 9</b>	1,67
20/4-9	20		2,22
25/4-9	25		2,78
30/4-9	30		3,33
40/4-9	40		4,44
50/4-9	50		5,55
15/5-12	15	<b>5 - 12</b>	1,25
20/5-12	20		1,67
25/5-12	25		2,08
30/5-12	30		2,5
40/5-12	40		3,33
50/5-12	50		4,17
<b>15/6-15</b>	<b>15</b>	<b>6 - 15</b>	<b>1</b>
20/6-15	20		1,33
25/6-15	25		1,67
30/6-15	30		2
40/6-15	40		2,67
50/6-15	50		3,33

Designation	t <sub>F</sub> [mm]	b <sub>min</sub> - b <sub>max</sub> [mm]	t <sub>F</sub> / b <sub>max</sub> *) [--]
20/9-20	20	9 - 20	1
25/9-20	25		1,25
30/9-20	30		1,5
40/9-20	40		2
50/9-20	50		2,5
<b>20/11-25</b>	<b>20</b>	11 - <b>25</b>	<b>0,8</b>
25/11-25	25		1
30/11-25	30		1,2
40/11-25	40		1,6
50/11-25	50		2
30/18-34	30	18 - 34	0,88
35/18-34	35		1,03
40/18-34	40		1,18
50/18-34	50		1,47
<b>30/24-42</b>	<b>30</b>	24 - <b>42</b>	<b>0,71</b>
40/24-42	40		0,95
50/24-42	50		1,19

\*) The selected and tested dimensions of the sealing tape include the most unfavourable (highest) compression value.